CLAIMS

WHAT IS CLAIMED IS:

1. An optical device, comprising:

a first element having a first index of refraction; and

a second element that communicates with the first element and has a second index of refraction,

wherein one of said first and second elements can change the entry direction of a radiated beam into the other of said first and second elements.

2. The optical device of claim 1, wherein the first element has a variable index of refraction and the second element has a fixed index of refraction.

3. The optical device of claim 1, wherein the first element has a first variable index of refraction and the second element has a second variable index of refraction.

4. The optical device of claim 3, wherein the second variable index of refraction is fixable to a selected value.

5. The optical device of claim 1, wherein the first element can change the entry direction of a radiated beam into the second element.

6. The optical device of claim 1, wherein the first element can change the entry direction of the radiated beam into the second element to cause total internal reflection of the beam in the second element.

7. The optical device of claim 1, wherein the first element includes a refractive layer that is responsive to an electric field.

8. The optical device of claim 7, wherein the electric field is variable.

9. The optical device of claim 5, further comprising a first and second orienting layer disposed on the first and second conductive substrates, respectively, wherein the first and second orienting layer face each other with the refractive layer disposed between the first and second orienting layers.

10. The optical device of claim 9, wherein the first and second orienting layers comprise at least one material selected from the group consisting of silicon monoxide and magnesium fluoride.

11. The optical device of claim 1, wherein the first element includes a refractive layer that is responsive to at least one of a magnetic field and high-intensity light.

12. The optical device of claim 1, wherein the first element includes a refractive layer that comprises at least one selected from the group consisting of liquid crystal, poly (N-vinylcarbazole) (PVK), PMMA, or a photorefractive material.

13. The optical device of claim 1, wherein the first element includes a liquid crystal layer that acts as a refractive layer.

14. The optical device of claim 13, wherein the liquid crystal layer contains a plurality of liquid crystal molecules arranged in substantially heterotropic alignment in the refractive layer.

15. The optical device of claim 1, further comprising an adjustment mechanism in communication with the first element to control the first variable index of refraction.

16. The optical device of claim 15, wherein the adjustment mechanism is a variable voltage source and the first element includes a first and a second conductive substrate, and wherein applying a variable voltage to the first and second conductive substrate results in a variable electric field.

17. The optical device of claim 16, wherein the first and the second conductive substrates comprise metal.

18. The optical device of claim 16, wherein the first and the second conductive substrates comprise an electrically conductive material deposited on non-conductive plates.

19. The optical device of claim 1, wherein the radiated beam at an interface between the first element and the second element includes a spurious signal, and wherein at least one of the first element and the second element has a length that attenuates the spurious signal to a predetermined desirable level.

20. The optical device of claim 1, wherein an optical switch controls an exit direction of the radiated beam to switch between a first direction and a second direction.

21. The optical device of claim 1, wherein an optical switch controls an exit direction of the radiated beam to scan over a selected range.

22. An optical device, comprising:

an active element having

a first conductive substrate;

a second conductive substrate,

a first orienting layer; and

a second orienting layer disposed on the first and second conductive substrates and facing one another, and

a refractive layer disposed between the first and second orienting layers and having a variable index of refraction that is responsive to the electric field; and

a passive element, wherein one of the active element and the passive element can change an entry direction of a radiated beam into the other of the active element and the passive element.

23. The optical device of claim 22, wherein the passive element has a fixed index of refraction.

24. The optical device of claim 22, wherein the passive element has a variable index of refraction that is fixable to a selected value.

25. The optical device of claim 22, wherein the active element can change the entry direction of the radiated beam into the passive element to achieve total internal reflection of the beam in the passive element.

26. The optical device of claim 22, wherein the passive element can change the entry direction of the radiated beam into the active element to achieve total internal reflection of the beam in the active element.

27. The optical device of claim 22, wherein the electric field is variable.

28. The optical device of claim 27, further comprising a variable voltage source in communication with the first and second conductive substrates for applying the variable voltage, and wherein varying the voltage results in the variable electric field that controls the first index of refraction.

29. The optical device of claim 22, wherein the refractive layer is a liquid crystal layer.

30. The optical device of claim 29, wherein the liquid crystal layer contains a plurality of liquid crystal molecules arranged in heterotropic alignment in the refractive layer.

31. The optical device of claim 22, wherein the refractive layer comprises at least one selected from the group consisting of liquid crystal, poly (N-vinylcarbazole) (PVK), PMMA, or a photorefractive material.

32. The optical device of claim 22, wherein the first and the second conductive substrates comprise metal.

33. The optical device of claim 22, wherein the first and the second conductive substrates comprise an electrically conductive material deposited on non-conductive plates.

34. The optical device of claim 22, wherein the first and second orienting layers comprise at least one selected from the group consisting of silicon monoxide and magnesium fluoride.

35. The optical device of claim 22, wherein the radiated beam at an interface between the active element and the passive element includes a spurious signal, and wherein at least one of the active element and the passive element has a length that attenuates the spurious signal to a predetermined desirable level.

36. The optical device of claim 22, wherein an optical switch controls an exit direction of the radiated beam to switch between a first direction and a second direction.

37. The optical device of claim 22, wherein an optical switch controls an exit direction of the radiated beam to scan over a selected range.

38. A method of manufacturing an optical device, the method comprising:

providing an active element having a refractive layer having a variable index of refraction between first and second conductive layers; and

coupling the active element to a passive element having a fixed or fixable index of refraction to form the optical device,

wherein a voltage applied to the first and second conductive layers results in an electric field.

39. The method of claim 38, further comprising establishing communication between a variable voltage source and the first and second conductive layers to vary the electric field.

40. The method of claim 38, further comprising depositing a first and a second orienting layer on the first and a second conductive layers, respectively, wherein the refractive layer is sandwiched between the first and second orienting layers.

41. The method of claim 40, wherein the depositing is conducted via vacuum deposition.

42. The method of claim 41, wherein the depositing material is at least one selected from the group consisting of silicon monoxide and magnesium fluoride.

43. The method of claim 38, wherein the refractive layer is a liquid crystal layer containing a plurality of liquid crystal molecules, and wherein a depositing act includes aligning the liquid crystal molecules in heterotropic alignment.

44. The method of claim 38, wherein the coupling act includes depositing an active element material on a portion of a substrate to form an active element portion and a passive element portion.

45. A method of manufacturing an optical device, comprising:
providing a first element having a first index of refraction;
providing a second element having a second index of refraction; and
establishing communication between the first and the second elements.

46. The method of claim 45, wherein the first index of refraction is variable.

47. The method of claim 45, wherein the second index of refraction is variable.

48. The method of claim 47, wherein the second index of refraction is fixable.

49. The method of claim 45, wherein the second index of refraction is fixed.